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(54) LAMINATION TYPE POROUS SHEET AND  
MANUFACTURE THEREOF

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a lamination type porous sheet having a cushion property and strength of coat consistently, and a manufacturing method thereof.

SOLUTION: The lamination type porous sheet includes a sheet-like support body and at least a double cellular

resin layer formed by applying and thereafter drying mechanically stirred foamed resin-containing liquid in a mixed liquid consisting mainly of resin and pigments on at least one surface of the sheet-like support body, wherein a heat-melting temperature of the cellular resin layer situated outward among the cellular resin layers is 80-180°C, and an average diameter of the surface pores is 0.5-50 µm.

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**CLAIMS**

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**[Claim(s)]**

**[Claim 1]A lamination type porous sheet characterized by what it is [ a thing ] characterized by comprising the following.**

**Sheet shaped support.**

An inside stoma content resin layer of at least one layer formed on one of them.

Have the outside stoma content resin layer formed on the lateral surface, and each of said inside and an outside stoma content resin layer, It is formed by applying and drying cellular content resin coating liquid prepared by giving mechanical agitation to film-forming resin liquid, and said outside stoma content resin layer is the melting temperature of 80–160 \*\*.

A surface part average stoma diameter of 0.5–50 micrometers.

**[Claim 2]Face manufacturing the lamination type porous sheet according to claim 1, and mechanical agitation is given to resin liquid which contains film-forming resin for at least one sort of inside air–bubbles content resin coating liquid, and one sort of outside air–bubbles content resin coating liquid, respectively, By making many fine bubbles contain, prepare and on the 1st [ at least ] page of sheet shaped support, Apply said at least one sort of inside air–bubbles content resin coating liquid, and dry and an inside stoma content resin layer of at least one layer is formed, A manufacturing method of a lamination type porous sheet characterized by what said outside air–bubbles content resin coating liquid is applied, it dries and an outside stoma content resin layer is formed for on lateral surface of this inside stoma content resin layer.**

**[Claim 3]Face manufacturing the lamination type porous sheet according to claim 1, and mechanical agitation is given to resin liquid which contains film-forming resin for at least one sort of inside air–bubbles content resin coating liquid, and one sort of outside air–bubbles content resin coating liquid, respectively, By making many fine bubbles contain, prepare and on the 1st [ at least ] page of sheet shaped support, Apply said at least one sort of inside air–bubbles content resin coating liquid, and an inside air–bubbles content resin coating liquid layer of at least one layer is formed, A manufacturing method of a lamination type porous sheet characterized by what said outside air–bubbles content resin coating liquid is applied, these coating liquid layers are dried, and an inside stoma content resin layer of at least one layer and an outside stoma content resin layer of one layer are formed for on lateral surface of this inside air–bubbles content resin coating liquid layer.**

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]**This invention relates to a porous sheet which has many openings in the surface and an inside, and has a resin layer more than two-layer [ with high ink or absorptivity of a toner, cushioning properties, and adiathermancy ], and a manufacturing method for the same. The porous sheet of this invention is used suitably for office-use papers, such as a heat-of-fusion transfer image receiving sheet in which it is required that the absorptivity of ink should be high, an ink jet image receiving sheet, or a sheet for electro photography, etc.

**[0002]**

**[Description of the Prior Art]**Some composite sheets which provided much more porous layer on the base material for the purpose of the cushioning properties of a sheet and adiathermic improvement are proposed. for example, the example (JP,2-89690,A.) which provided the undercoat layer containing an empty capsid on the base material The resin layer having contained the ingredient eluted underwater is formed on the base material which uses JP,64-27996,A and a plastic as the main ingredients, The example which carries out elution removal of the water-soluble materials from this resin layer, and forms a porous layer (JP,2-41287,A), After carrying out coating of the expandable plastic filler containing a low-boiling point solvent and drying on a base material, Mechanical agitation is given to the example (JP,2-3396,A) which heated this and formed the foaming surface layer, and resin containing liquid, and the example (JP,8-310145,A) etc. which carried out coating of the cellular content liquid which made many fine bubbles contain on the surface of a base material, dried and formed the porous layer are known. However, there was a problem these conventional methods of the cushioning properties of an image receiving sheet and/or adiathermancy which are acquired cannot yet be insufficient, or incompatible in film strength and cushioning properties.

**[0003]**Have the characteristics, like the sheet which has much more porous layer has ink or the absorptivity of a toner, cushioning properties, and high adiathermancy, and this characteristic is used, It is suitably used as an image receiving sheet for copying machines of the heat-of-fusion transfer recording method, ink jet recording method, and electrophotographing system which are used for printers, such as a word processor and a facsimile.

**[0004]**In the printer and copying machine of said heat-of-fusion transfer recording method, an ink jet recording method, or an electrophotographing system, Since full-color-izing of a picture and high definition-ization are progressing, and the amount of the image receiving sheet used increases one by one and the use is also expanded, paper, a film, or a synthetic paper is used as a substrate, and the appearance of the image receiving sheet in which high-definition image reproduction is possible is demanded strongly.

**[0005]**In order to acquire the high-definition picture with small gloss contrast of blank parts and a picture part which has little mottle of a recorded image part in an electrophotographing system as an information storage paper, for example, At the time of melting fixing of a toner, it is important to prevent the horizontal breadth in the coating layer surface of a toner, and to keep the toner which adjoins \*\* from joining. If it has the capability for a porous layer to be fully able to absorb a toner inside a porous layer when the sheet which has much more porous layer is

used as an image receiving sheet of an electrophotographing system. The mottle of a recorded image part is prevented, the unnatural gloss of a picture part can be controlled, or such a sheet has fitness high as an image receiving sheet in which high-definition image reproduction is possible.

[0006]In order to obtain the transfer picture which has a high tone reproduction and record density by a heat-of-fusion transfer recording method, it is important that the dot shape of the ink by which melting transferring was carried out in the wide range covering high applied energy from low applied energy is reproduced faithfully. In record with a heat-of-fusion transfer printer, compressive force is received and stuck to the surface and the ink ribbon for transfer of an image receiving sheet, and the cushioning properties of an ink image receiving layer are considered to participate in the reproducibility of a dot greatly on the mechanism in which ink is transferred by the image receiving sheet from an ink ribbon. It is thought that the ink image receiving layer which receives the fused ink needs the adiathermancy of a sheet itself [ the outstanding ink absorptive power and ], etc. for coincidence. When the sheet which has much more porous layer is used as an image receiving sheet of a heat-of-fusion transfer recording method, since the structure top ink absorbency, cushioning properties, and adiathermancy are high, said porous sheet, Fitness high as an image receiving sheet in which high-definition image reproduction with good tone reproduction and dot reproducibility is possible is consisted.

[0007]In order to acquire good dot reproducibility in record of a heat-of-fusion transfer printer as mentioned above, the one where the cushioning properties of an image receiving sheet are higher is advantageous, but. Since the cushioning properties of a sheet are determined by the density of an image receiving layer itself [ by which coating was carried out ], for obtaining high cushioning properties, they must make density of an image receiving layer low. However, when the density of a porosity image receiving layer is low, the resin layer wall surrounding the stoma inside an image receiving layer \*\*-izes, the intensity of an image receiving layer coat falls, at the time of record with a heat-of-fusion transfer printer, exfoliation of an image receiving layer surface portion is produced, and a good recorded image may not be obtained. In the porous sheet which has a bubble containing layer of a monolayer, for obtaining high cushioning properties, density of the whole layer needed to be made low. However, if it is made such, since the difficulty of the intensity of the resin paint film surface part which touches melted ink running short is produced, there is a limit in making density of a bubble containing layer low, and it may become insufficient in intensity as an image receiving sheet.

[0008]As image receiving sheets, such as said heat-of-fusion transfer recording method, an ink jet recording method, and an electrophotographing system, When the porous sheet which has a bubble containing layer of a low-density monolayer is used and the image recording sheet is used for industrial use, such as a tag and a label, Since the problem that the printing unit suffers a loss arises when it stuck on the time of reading by a pen type bar code reader, or the container for articles, and conveying and various articles are contacted, the appearance of the porous sheet with high endurance to a scratch is demanded strongly.

[0009]The water soluble resin or moisture powder type resin which is the main raw material of the porous layer in the sheet which has a single porous layer, Since blocking may be caused under high-humidity/temperature or a poor run may occur within a printer as the time of formation of the roll of a porous sheet, or a sheet at the time of storage, sufficient consideration is required for selection of resin for porous layer formation.

[0010]

[Problem(s) to be Solved by the Invention]This invention tends to cancel the above-mentioned problem of conventional technology, and tends to provide cushioning properties and the lamination type porous sheet which can control film strength.

[0011]

[Means for Solving the Problem]An inside stoma content resin layer of at least one layer by which a lamination type porous sheet of this invention was formed sheet shaped support and on one of them, Have the outside stoma content resin layer formed on the lateral surface, and each of said inside and an outside stoma content resin layer, It is formed by applying and drying cellular content resin coating liquid prepared by giving mechanical agitation to film-forming resin

liquid, and said outside stoma content resin layer has melting temperature of 80–160 \*\*, and a surface part average stoma diameter of 0.5–50 micrometers. A manufacturing method (1) of a lamination type porous sheet concerning this invention, Face manufacturing the aforementioned lamination type porous sheet, and mechanical agitation is given to resin liquid which contains film-forming resin for at least one sort of inside air–bubbles content resin coating liquid, and one sort of outside air–bubbles content resin coating liquid, respectively, By making many fine bubbles contain, prepare and on the 1st [ at least ] page of sheet shaped support, Said at least one sort of inside air–bubbles content resin coating liquid is applied, it dries and an inside stoma content resin layer of at least one layer is formed, on lateral surface of this inside stoma content resin layer, said outside air–bubbles content resin coating liquid is applied, it dries and an outside stoma content resin layer is formed. A manufacturing method (2) of a lamination type porous sheet concerning this invention, Face manufacturing the aforementioned lamination type porous sheet, and mechanical agitation is given to resin liquid which contains film-forming resin for at least one sort of inside air–bubbles content resin coating liquid, and one sort of outside air–bubbles content resin coating liquid, respectively, By making many fine bubbles contain, prepare and on the 1st [ at least ] page of sheet shaped support, Apply said at least one sort of inside air–bubbles content resin coating liquid, and an inside air–bubbles content resin coating liquid layer of at least one layer is formed, On lateral surface of this inside air–bubbles content resin coating liquid layer, said outside air–bubbles content resin coating liquid is applied, these coating liquid layers are dried, and an inside stoma content resin layer of at least one layer and an outside stoma content resin layer of one layer are formed.

[0012]

[Embodiment of the Invention]As a result of inquiring wholeheartedly that this invention persons should attain the above-mentioned purpose, by giving mechanical agitation to resin containing liquid, carrying out coating of at least two or more kinds of two or more resin containing liquid which made many fine bubbles contain, and drying, By more than a bilayer's having a porous coating layer which has a detailed stoma, and rationalizing the average stoma diameter of the lamination type porous layer surface, it finds out that an aforementioned problem can be attained and came to complete this invention. Namely, it can be compatible now in the outstanding film strength and outstanding cushioning properties by more than a bilayer forming the porous coating layer of a base material on the whole surface at least. After producing the porous sheet of the letter of rolling up by a coating method, blocking generating of the porous sheet processed under storage or into a sheet shaped could be controlled.

[0013]When the lamination type porous sheet of this invention is used as information storage papers, such as a heat-of-fusion transfer recording method, an ink jet recording method, and an electrophotographing system, the outstanding recording performance is revealed. The reason is considered that the physical characteristic (structural characteristic and surface smoothness) of a porous sheet is involving. Namely, since many detailed holes exist in the surface of the outside stoma content resin layer of a porous sheet if it sees from the field of a structural characteristic, The absorption effect (anchor effect) of the outstanding ink by capillarity or a toner is revealed, and the ink into a porous sheet or osmosis of a toner becomes good, and it is thought that the high competence over ink or a toner is revealed.

[0014]In this point, the size of the stoma in the surface of the outside stoma content resin layer in the porous layer formed on the base material is important. That is, when ink and the toner at the time of information storage are transferred, in order to form a good picture on the lamination type porous sheet of this invention, it is required for the average diameter of the stoma distributed over the surface of an outside stoma content resin layer to be 0.5–50 micrometers, and it is 0.5–20 micrometers preferably. Osmosis into the stoma content resin layer of ink or a toner has few average stoma diameters at less than 0.5 micrometer, and sufficient absorptance is not obtained. When it is larger than 50 micrometers, ink or a toner is buried into a stoma, transfer unevenness happens easily, poor dot reappearance is produced, and it becomes impossible to form a good picture. However, on the mechanism of a heat-of-fusion transfer recording method, when the lamination type porous sheet of this invention is used as an image receiving sheet of a heat-of-fusion transfer recording method, since the above-mentioned

transfer unevenness and flaking take place easily, it is preferred [ the average stoma diameter of the outside stoma content resin layer surface ] that it is 0.5–30 micrometers. The stoma diameter of the surface of a stoma content resin layer is measurable using an optical microscope, or a scanning electron microscope photograph and an image analyzing device.

[0015]The size of the stoma of the outside stoma content resin layer surface, What is necessary is just to set up properly various factors, such as quantity which remains as an ingredient directly related to the film thickness in a porous layer or the aforementioned expansion ratio, and a coating method, after the presentation of the resin content coating liquid in front of cellular formation and distributed processing, i.e., the kind of material, the rate of a compounding ratio, air bubbles, coating, and desiccation. Furthermore the size of the stoma in the surface of the outside stoma content resin layer in this invention, It is related to the size and stability of air bubbles in the cellular content resin liquid prepared by mechanical agitation, and the stoma of the outside stoma content resin layer after spreading desiccation, i.e., the ink image receiving layer surface, also becomes small, so that the air bubbles in resin liquid are small in general and it is stable. Therefore, although restriction in particular will be in the cellular content state in resin coating liquid, as for the size of air bubbles, it is preferred that it is in within the limits the whose same size as the stoma in said outside stoma content resin layer surface, i.e., an average diameter, is 0.5–50 micrometers, and an average diameter is 0.5–20 micrometers more preferably. The size of the air bubbles to contain can take a photograph of the part with an optical microscope, and can measure it with an image analyzing device.

[0016]In this invention, each of the inside formed on sheet shaped support and an outside air-bubbles content resin layer includes paints as the main ingredients by resin and necessity. Such a porous resin layer can be formed by giving mechanical agitation, making this carry out formation distribution of many detailed air bubbles, carrying out coating of this cellular content resin liquid to a base material, and drying to the liquid object containing the mixture of resin or resin, and paints. As usable film-forming resin, by this invention, For example, polyvinyl alcohol and its derivative of various molecular weights and the degree of saponification, The derivative of starch and starch (for example, various modified starches like an oxidized starch and cation-ized starch), Methoxy cellulose, carboxymethyl cellulose, methyl cellulose, Cellulosics, such as ethyl cellulose, sodium polyacrylate, a polyvinyl pyrrolidone, An acrylic acid amide acrylic ester copolymer, an acrylic acid amide acrylic ester methacrylic-acid-ester copolymer, The alkali salt, the polyacrylamide, and its derivative of a styrene maleic anhydride copolymer, Water soluble resin, such as a polyethylene glycol, and polyvinyl acetate, Polyurethane, an acrylic urethane copolymer, a styrene butadiene copolymer (SBR RATESSUKU), An acrylonitrile butadiene copolymer (NBR latex), polyacrylic ester, Resin, such as a polyvinyl chloride acetate copolymer, polybutyl methacrylate, an ethylene-vinylacetate copolymer, a styrene butadiene acrylic copolymer, and a polyvinylidene chloride, and also glue, casein, soybean protein, Although gelatin, sodium alginate, etc. can be used, it is not limited to these. Two or more kinds can use these resin if needed, being able to be independent or mixing.

[0017]In this invention, as paints which can be included in the inside and an outside air-bubbles content resin layer, For example, a zinc oxide, titanium oxide, calcium carbonate, silicic acid, silicate, clay, Talc, mica, calcination clay, aluminium hydroxide, barium sulfate, Real balls, such as inorganic pigments, such as lithopone and colloidal silica, polystyrene, polyethylene, polypropylene, an epoxy resin, and a styrene acrylic copolymer, hollow. Or although an organic color, starch powder, cellulose powder which are called the plastic pigment of the type processed into various shape can be used, it is not limited to these. Two or more sorts can use these paints independently if needed, mixing. If various paints are blended with the cellular content resin layer in this invention, film strength may fall, and it may become a cause of troubles, such as producing the coat deficit after the coat exfoliation and image formation at the time of image recording. Therefore, when various kinds of paints are included in moisture powder type resin containing liquid and it forms the inside and an outside stoma content resin layer, naturally in consideration of the synthetic quality as an image receiving sheet, paints are used by a proper compounding rate.

[0018]In the resin liquid before cellular formation, or the mixed liquor of resin and paints, one or

more sorts, such as a known viscosity modifier, a dispersing agent, a stain, a water resistance-ized agent, lubricant, a cross linking agent, and a plasticizer, can be added if needed.

[0019]In this invention, to the method (this is described as a foaming method below) of carrying out formation distribution content of the air bubbles into resin liquid. For example, the foaming machine for what is called confectionery which has an impeller which rotates carrying out a sun and planet motion, Agitators generally used for emulsification dispersion etc., such as a homomixer and cow loess dissolver, Or although it can agitate mechanically and continuation foaming machines, such as the device which can distribute air to detailed air bubbles and can be mixed, for example, the U.S. Gaston County company, and Stoke in the Netherlands, can be used, feeding air and the mixture of resin containing liquid continuously in a sealing system, There is no restriction especially strict with these foaming methods.

[0020]In this invention, in order to improve the stability of the air bubbles which resin liquid is made to contain, material with the surface activity operation called the foam stabilizer and the foaming agent may be selected suitably, and may be blended. For example, especially the surface-active agent of negative ion nature, such as higher fatty acid, a higher-fatty-acid denaturation thing, alkali salt of high-class aliphatic series, and amine salt of higher fatty acid, has an effect which improves the fizz of resin liquid, and the high stability improvement effect of air bubbles which carried out distributed content. As for use of material with a possibility of checking the mobility of resin liquid remarkably or spoiling coating workability, avoiding is proper although there is no strict restriction in particular in selection of these foam stabilizers or a foaming agent. However, the rate of a compounding ratio to said resin liquid of the above-mentioned foam stabilizer and a foaming agent comes out zero to 30 weight section by solid content to solid content 100 weight section of resin liquid, and a certain thing is preferred, and it is one to 20 weight section more preferably. Even if it blends this exceeding 30 weight sections, the effect is saturated and becomes disadvantageous economically in many cases.

[0021]As sheet shaped support used for this invention, it is usable in cloth, such as textile fabrics including papers which use cellulose as the main ingredients, such as paper, coated paper, and a laminated paper, and a nonwoven fabric. Porous synthetic resin films etc. which consist of plastic films, such as polyolefine, methacrylate, and cellulose acetate, polyolefine, and paints, such as a synthetic paper, a foaming polyethylene terephthalate film, a foaming polypropylene film, can be used. An adiathermic better thing has dot reproducibility and the better tone reproduction of a picture at the same applied energy, and these base materials are effective also in energy saving, in order that there may be few amounts of energy required in order to be able to attain the increase in record density and to acquire the same concentration and recording quality and they may end. Especially when the paper and coated paper which contain pulp as the main ingredients are used as a base material, there is an advantage of being recyclable.

[0022]Although the inside of the lamination type porous sheet of this invention and the outside stoma content resin layer can make the mixture liquid which includes aforementioned moisture powder type resin liquid or moisture powder type resin, and paints as the main ingredients able to contain many fine bubbles, and can carry out coating of this coating liquid on sheet shaped support and it can obtain by drying. There is no strict restriction in particular in the method of forming air bubbles and making it contain, equipment, and a coating method. Restriction in particular will be in the cellular content state of the moisture powder type resin liquid containing air bubbles. However, when using for information storage papers, such as a heat-of-fusion transfer recording method, an ink jet recording method, and an electrophotographing system, the volume ratio (it is described as expansion ratio below) to the undiluted solution of cellular content resin coating liquid exceeds 1 time, it is preferred that they are 10 or less times, and it is 5 or less times 1.1 or more-time more preferably. That is, expansion ratio is a measure which shows the cellular content in cellular water content distributed resin coating liquid, and if expansion ratio becomes large, it means that the thickness of the resin liquid film (wall) which constitutes air bubbles becomes thin. When expansion ratio is the same, it means that the resin layer (wall) surrounding the stoma of the stoma content resin layer obtained, so that the solids concentration of the moisture powder type resin liquid before foaming is low becomes thin. Thus,

it may become difficult to maintain the intensity of the stoma content resin layer obtained on enough levels, and what is necessary is just to set up the balance of expansion ratio and a presentation of resin liquid suitably in this point, if a resin layer wall becomes thin.

[0023]In order to form the lamination type porous sheet of this invention, Further the cellular content resin liquid for stoma content resin layer formation of eyes on a base material coating and after drying, The cellular content resin liquid for each stoma content resin layer formation after a bilayer eye one by one on the surface of this stoma content resin layer Coating, the method to dry, and what is called a wet one dry method, Without applying the cellular resin containing liquid for stoma content resin layer formation of eyes further, and drying it, the cellular content resin liquid for the stoma content resin layer formation after a bilayer eye is applied one by one, and coating, the method to dry, what is called a wet one wet method, etc. are simultaneously held in these resin liquid layers. When the adhesiveness of the paint of eyes is still higher, there is a problem of that it is easy to generate troubles, such as causing blocking at the time of rolling-up production, the adhesive strength of eyes and a bilayer eye being still lower, and film strength's falling, and the coating in a low coating amount becoming impossible etc. in said wet one dry method. Said wet one wet method can cancel the above-mentioned problem of a wet one dry method, and has the advantage of being applicable to the high paint of the adhesiveness which cannot usually carry out coating independently, the paint with which a surface condition with it is not obtained, etc. [ bad mobility and ] [ good ]

[0024]In this invention method, as a coating method for forming a lamination type stoma content resin layer on a base material, Although all of known methods, such as the May Ya Bar method, a gravure roll method, a roll method, a reverse roll method, a blade system, a knife method, an air knife method, an extrusion method, and a cast method, are applicable, Especially since the pressure which takes at the time of coating is small, and an extrusion method has good maintenance of the detailed air bubbles in cellular content resin coating liquid, it is preferred. The feeding block type with which the device called the feed block for making a paint join generally to an extrusion method is installed in the anterior part of a coating head, And there is a coextrusion process represented with the inside of a coater by the multi-manifold type which makes several sorts of paints join, the stack plate type, etc., and any method can be applied to this invention method. Two or more extruders of a monolayer are arranged to the circumference of one backing roll, and the in-series extrusion process which extrudes two or more sorts of different paints, the method of arranging an extrusion station to two or more set series, etc. can be applied to it.

[0025]When carrying out lamination coating of said two or more cellular content resin coating liquid on a base material with a co-extrusion method, when the viscosity difference of these cellular content resin liquid is large, The phenomenon in which a paint with low viscosity called ENKA bushing ration migration wraps in a paint with high viscosity may occur. What is necessary is just to carry out temperature controlling corresponding to the viscosity control of cellular content resin coating liquid, and viscosity change, in order to use each class of said two or more stoma content resin layers as a uniform layer. Namely, what is necessary is just to set up the viscosity of the resin liquid before foaming suitably in consideration of the viscosity of the resin liquid after foaming, since the resin liquid which made many detailed air bubbles of this invention contain also has the viscosity of resin liquid in the tendency which becomes high so that expansion ratio is high.

[0026]The embodiment of the lamination of the lamination type porous sheet of this invention is illustrated to drawing 1 – drawing 4. However, the lamination of the lamination type porous sheet of this invention is not limited to these modes. Drawing 1 is the example which provided the stoma content resin layer more than a bilayer on the whole surface of the sheet shaped support 1. Although the inside stoma content resin layer 2 formed on the base material 1 is cheap, Although the outside stoma content resin layer 3 which was formed using low resin of blocking resistance and formed on it is expensive, it is formed using resin excellent in blocking resistance, and maintenance of good blocking resistance and coexistence of a reduce manufacturing cost are possible for it by it. By carrying out coating of the cellular content resin coating liquid with high expansion ratio as the inner layer 2, forming a low-density inner resin layer, and forming a

high-density outer layer using cellular content resin coating liquid with expansion ratio low as the outer layer 3. It is possible to reconcile the endurance of a coating layer outer surface and the cushioning properties of a coating layer etc. However, the combination of use resin in the inside and an outer layer and expansion ratio is not limited to these. The layered product of said inside stoma content resin layer and an outside stoma content resin layer is hereafter described as a lamination type porous resin layer.

[0027] Drawing 2 is the example which formed the inside-and-outside side stoma content resin layers 2 and 3 more than a bilayer on the whole surface of the sheet shaped support 1 like drawing 1, and formed the nonvesicular layer 4 in the field of another side of the sheet shaped support 1. When carrying out coating of the cellular content resin coating liquid on the aforementioned sheet shaped support and manufacturing the lamination type porous sheet of this invention, in processes, such as coating, desiccation, and rolling up, the sheet itself may use the coating surface as the inside or the outside, and it may curl. Therefore, when cutting out this sheet to a prescribed dimension and using it as a sheet for image formation, troubles, like that feeding to various printers is not performed normally or the performance traverse in the inside of a printer gets worse may be generated. Since especially a melting transferring recording method is a method which a heat source is made to contact an ink ribbon and transfers the color ingredient in a ribbon on a recording sheet, It originates in the difference of the contraction accompanying heating between the resin layer which forms an image formation side, and a support layer, or the difference of the expansion characteristic, curl is generated in an image receiving sheet inside a device, and the above troubles occur. A picture is aslant formed to the normal direction of space for such curl generating, or it becomes easy to generate wrinkles on a sheet inside a device, and, for this reason, contact with an ink ribbon and an image receiving sheet may not be performed normally, but poor ink transfer may be caused, and, as a result, imaging quality may deteriorate. As well as the time of record when using the lamination type porous sheet of this invention as an image receiving sheet of an electrophotographing system, since the heating process by a heat roll is included, the trouble by curl of a sheet may produce fixing of a toner with a heat-of-fusion transfer method.

[0028] In order to prevent various kinds of troubles which such curl becomes a cause and produces, it is desirable to make the difference of the shrink characteristics by heating between a lamination type porous resin layer and a support layer or the difference of the expansion characteristic as small as possible. therefore — receiving as shown in drawing 2, the rear faces 2 and 3, i.e., the lamination type porous resin layers, of a base material, — the field of an opposite hand — the nonvesicular curl prevention layer 4 — coating — or it may laminate. There is no restriction in the material of this curl prevention layer 4, a formation method, a coating amount, and the amount of laminations, various factors, such as the description of the kind of base material, thickness, or a lamination type porous resin layer, i.e., material composition, expansion ratio, and a coating amount, can be taken into consideration, and optimization can be achieved.

[0029] When the lamination type porous sheet obtained depending on the material which forms a base material runs within a printer, on the mechanism of a device, various frictional forces may be received, or independently, the influence of the humidity fall inside the device by heating, etc. compounds, and may electrify static electricity in this lamination type porous sheet. If several Oshi's image formation is continuously performed in such a state, the image formation side of this lamination type porous sheet and the rear face of the following lamination type porous sheet will stick electrostatically, and will become difficult to separate. Since there is character to be easy to be charged intrinsically, when especially various plastic sheets or a synthetic paper etc. uses these as a base material, the rear surface of a sheet becomes difficult to remove them during the storage a sheet chemically-modified [ by cutting ] degree, or after processing for static electricity generating. Even when papers are used as a base material with a natural thing, the above troubles may arise. It is very effective to form what is called an antistatic layer in the rear-face side of a lamination type porous sheet like drawing 2 for the trouble prevention accompanying such electrification. The prevention from electrification can be attained using antistatic materials or by reducing the coefficient of friction between the sheets of this sheet

rear face and a lamination type porous layer. Therefore, an antistatic layer can be suitably selected from an extensive material and a method like curl prevention layer formation, and can be formed.

[0030] After manufacture of said lamination type porous sheet, to the porous resin layers 2 and 3 of a base material For the discernment of a porous resin layer side to the field of an opposite hand, And various kinds of printings may be further performed on the image formation within a printer for printing of the detection mark for required control for a company name, a trade name, or logo mark printing. Therefore, it is also possible to give ink set nature by forming in the rear face of a lamination type porous sheet the layer which has a printability like drawing 2. Although it is possible to form individually an aforementioned curl prevention layer, antistatic layer, and printability grant layer in the rear face of a base material, and to obtain expected performance, By selecting material and a formation method suitably if needed, simplification of a manufacturing process, reduction of a manufacturing cost, or an expected functional level can be formed in a monolayer, and can attain the purpose. That is, it is also possible to give functions, such as prevention from curl, prevention from electrification, and a printability, by a monolayer.

Therefore, in the number of the layers formed in the rear face of sheet shaped support, there is no restriction in any way.

[0031] Drawing 3 is the example which formed the lamination type porous layers 5 and 6 more than two-layer on the field of the others which formed the lamination type porous resin layers 2 and 3 more than a bilayer on the 1st page of the sheet shaped support 1. By specifying suitably the performance of the inside stoma content resin layers 2 (surface) and 5 (rear face) and the outside stoma content resin layers 3 (surface) and 6 (rear face), it is possible to give the completely same function as both sides of a sheet, to give a completely different function, etc. It is easy to provide the lamination type porosity resin 2 and 3 and 5 or 6 layers in both sides of the sheet shaped support 1 to a demand of everything to a porous sheet, and there is, and it is [ manufacture ] satisfactory also on a various-physical-properties target in any way. Since the double-sided porous resin layer has the same contraction or the expansion characteristic especially when the same lamination type porous resin layer is provided in both sides of a base material again, there is a merit of being hard to generate the curl accompanying change of storage environment and heating in various image forming devices.

[0032] Drawing 4 is the example which formed the lamination type porous resin layers 2 and 3 more than a bilayer on the whole surface of the sheet shaped support 1 like drawing 1, and provided the nonvesicular layer on the outside stoma content resin layer 3. For example, in writing fitness with a pencil, the surface of an outside air-bubbles content resin layer may be insufficient, and improvement in note nature is possible in this case by providing a paints content resin layer on the outside stoma content resin layer 3. The nonvesicular layer formed in the surface of the outside stoma content resin layer 3 in this invention, Or there is no restriction in the paints which can be included in the nonvesicular layer formed in the rear face of a base material in any way, for example, necessity is answered out of the paints for said rear-face non-mind porous layer 4, and it can perform independent or that two or more kinds use it, mixing.

[0033] Although the lamination type porous sheet of this invention can show good image recording performance also in coating and the dried state one by one on sheet shaped support, two or more sorts of cellular content resin coating liquid, The super calender constituted combining suitably the machine calendar which furthermore comprises two or more steps of metal rolls or a metal roll and the roll made of resin, a metal roll, the roll made from a cotton, etc. is used, Finish processing can be performed to this lamination type porous sheet, and the smooth nature of that surface can be raised further. the cast drum etc. which gave mirror finish for the surface of the lamination type porous layer of the sheet which is in a semiarid condition or dryness after coating -- warming -- or -- un--- warming -- it may be made to contact in a state and the surface smoothness may be raised. However, if the above-mentioned smooth finish processing is performed under excessive welding pressure, the resin layer wall which encloses the air bubbles in a porous resin layer will be destroyed. Since a lamination type porous resin layer is elaborated, and the adiathermancy and cushioning properties fall or modification and destruction of the stoma of the lamination type porous resin layer surface take place, the

outstanding dot reproducibility which a lamination type porous resin layer has may not no longer be acquired. Therefore, what is necessary is just to set up a processing condition suitably on the occasion of the aforementioned smooth finish processing, so that the above-mentioned problem may not arise.

[0034]

[Example]The following example explains this invention still more concretely. However, the range of this invention is not restricted by these. The "part" in the following example and a comparative example, and "%", especially, as long as there is no notice, a "solid content weight section" and "% of the weight" are expressed.

[0035]resin mixed liquor \*\* (viscosity — 20,000 cp) which has the presentation of the example 1 following The agitator (trademark: KEMMIKKUSUAIKO PRO, made in the Aicohsha factory) was used for each of 35% of solids concentration, and resin mixed liquor \*\* (viscosity 20,000cp, 35% of solids concentration), and foaming treatment by agitating for 6 minutes by 490 rpm of agitating speeds was performed. The expansion ratio was 4.0, respectively.

presentation resin of resin mixed liquor \*\* SBR latex . (Trademark: 780A-206, Mitsui Toatsu Chemicals, Inc. make glass-transition-temperature:-22 \*\*) (trademark: — AG gum.) 100 copies Foam stabilizer Higher-fatty-acid system (trademark: the SN form 200, Sannopuko make) Ten copies Thickener Carboxymethylcellulose sodium presentation resin of Dai-Ichi Kogyo Seiyaku Co., Ltd. make five-copy resin mixed liquor \*\*. aqueous polyurethane resin (trademark: ADEKABON titer HUX-401, Asahi Denka Kogyo K.K. make) (trademark: — AG gum.) 100 copies Foam stabilizer Higher-fatty-acid system (trademark: the SN form 200, Sannopuko make) Ten copies Thickener Carboxymethylcellulose sodium Coating of the coating liquid which performed foaming treatment to resin mixed liquor \*\* of the presentation of the five-copy above by Dai-Ichi Kogyo Seiyaku Co., Ltd., and was prepared was carried out so that an applicator bar might be used and a coating amount (dry weight) might become 10 g/m<sup>2</sup> on the surface of the paper of fine quality of basis weight 75 g/m<sup>2</sup> immediately. Immediately, coating of the coating liquid prepared on the surface of this undried coating liquid layer by performing foaming treatment to resin mixed liquor \*\* of the above-mentioned presentation was carried out so that a coating amount might serve as 5 g/m<sup>2</sup> using an applicator bar, both coating liquid layers were dried, and the lamination type porous sheet was produced.

[0036]Making the coating amount of example 2 resin mixed liquor \*\* into 13 g/m<sup>2</sup>, except for having made the coating amount of resin mixed liquor \*\* into 2 g/m<sup>2</sup>, others produced the lamination type porous sheet like Example 1.

[0037]The agitator (trademark: KEMMIKKUSUAIKO PRO, made in the Aicohsha factory) was used for resin mixed liquor \*\* (viscosity 20,000cp, 35% of solids concentration) which has the presentation of the example 3 following, it agitated to it for 6 minutes by 490 rpm of agitating speeds, and foaming treatment was performed to it at this. The expansion ratio was 4.0.

presentation resin of resin mixed liquor \*\* (trademark: — MOBINIRU 742N.) Acrylic resin the Mitsui Toatsu Chemicals, Inc. make — 100 copies (trademark: — AG gum.) Foam stabilizer Higher-fatty-acid system (trademark: the SN form 200, Sannopuko make) Ten copies Thickener carboxymethylcellulose sodium Coating of the coating liquid which performed and prepared the same foaming treatment as Example 1 to resin mixed liquor \*\* of the five-copy aforementioned presentation by Dai-Ichi Kogyo Seiyaku Co., Ltd. was carried out so that an applicator bar might be used and a coating amount (dry weight) might serve as 10 g/m<sup>2</sup> on the surface of the paper of fine quality of basis weight 75 g/m<sup>2</sup> immediately. On the surface of this undried coating liquid layer, immediately, coating of the coating liquid prepared by performing foaming treatment to resin mixed liquor \*\* of the above-mentioned presentation was carried out so that a coating amount might serve as 5 g/m<sup>2</sup> using an applicator bar, both coating liquid layers were dried, and the lamination type porous resin layer was formed. Independently, water was mixed for the following ingredient and the coating liquid for back layers (10% of solid content) was prepared.

[Preparation of back layer coating liquid]

kaolinite clay (trademark: — HT clay.) ene gel hard company make — 100 copies (trademark: —

the prince ace A.) Sodium polyacrylate (trademark: made in [ Toagosei ] Aaron A-9) Five copies SBR latex (trademark :P T-1007, Nippon Zeon Co., Ltd. make) 20 copies Modified starch solution the product made from Prince Cornstarch — coating was carried out, five copies of this back layer coating liquid were dried so that a coating amount might serve as  $3 \text{ g/m}^2$  by May Ya Bar on the rear face of the base material which has the above-mentioned lamination type porous resin layer, the back layer was formed, and the lamination type porous sheet was produced.

[0038] Except for having used the PET film of basis weight  $100 \text{ g/m}^2$  as example 4 substrate, others produced the lamination type porosity image receiving sheet like Example 3.

[0039] Resin mixed liquor \*\* (viscosity 5,000cp, 35% of solids concentration) of the example 5 following presentation was agitated for 12 minutes by 490 rpm of agitating speeds using said agitator, and coating liquid 8.0 times the expansion ratio of this was prepared. The same resin mixed liquor of the presentation as resin mixed liquor \*\* of a statement was agitated for 4 minutes at 490 rpm in the Example 1, and coating liquid 2.0 times the expansion ratio of this was prepared.

presentation resin of resin mixed liquor \*\* Aqueous polyurethane resin . (Trademark: ADEKABON titer HUX-401, Asahi Denka Kogyo K.K. make) (trademark: — AG gum.) 100 copies Foam stabilizer Higher-fatty-acid system (trademark: the SN form 200, Sannopuko make) Ten copies Thickener Carboxymethylcellulose sodium Coating of the Dai-Ichi Kogyo Seiyaku Co., Ltd. make 2.5-copy resin mixed liquor \*\* was carried out so that an applicator bar might be used and a coating amount (dry weight) might serve as  $10 \text{ g/m}^2$  on the surface of the paper of fine quality of basis weight  $75 \text{ g/m}^2$  immediately after foaming treatment. On the surface of this undried coating liquid layer, after foaming treatment, immediately, coating of the resin mixed liquor \*\* of the above-mentioned presentation was carried out so that a coating amount might serve as  $5 \text{ g/m}^2$  using an applicator bar, both coating liquid layers were dried, and the lamination type porous sheet was produced.

[0040] Water was mixed for the ingredient of the example 6 following, and the coating liquid for finishing (10% of solid content) was prepared.

[Preparation of finishing coat coating liquid]

Calcium carbonate (trademark: #800, Komesho Sekkai Kogyo CO., LTD. make) 100 copies Polyvinyl alcohol (trademark—VA117, Nippon Synthetic Chemical Industry Co., Ltd. make) 20 copies this finishing coat coating liquid. On the surface of the lamination type porous sheet produced like Example 1, coating was carried out, it dried and finishing coat was formed so that a coating amount might serve as  $1\text{g}/\text{m}^2$  by May Ya Bar, and the lamination type porous sheet with finishing coat was produced.

[0041] The lamination type porous resin layer was formed in the rear face of the lamination type porous sheet produced like example 7 Example 1 by the completely same method as the surface, and the sheet which has a lamination type porous resin layer on both sides of a base material was produced.

[0042] Except for having agitated for 9 minutes by 340 rpm of agitating speeds of the example 8 aforementioned agitator, others produced the lamination type porous sheet like Example 1.

[0043] Except for having agitated for 12 minutes by 250 rpm of agitating speeds of the comparative example 1 aforementioned agitator, the lamination type porous sheet was produced like Example 1.

[0044] The mixed liquor of the same presentation as resin mixed liquor \*\* of comparative example 2 Example 1 after foaming treatment like Example 1 immediately, Coating was carried out and it dried so that an applicator bar might be used and a coating amount (dry weight) might serve as  $15 \text{ g/m}^2$  on the surface of the paper of fine quality of basis weight  $75 \text{ g/m}^2$ , and the monolayer type porous sheet was produced.

[0045] Measurement of the expansion ratio of the coating liquid obtained in each of the valuation method aforementioned example and a comparative example, And the following method estimated measurement of the stoma size of the porous resin layer of a porous sheet, the blocking resistance of a porous sheet, the cushioning properties of a porous resin layer, the

intensity of a porous resin layer, and the heat-of-fusion transfer record fitness of the porous sheet. These measurement and evaluation results are shown in Table 1 and 2.

[Measurement of expansion ratio] Weight of 100 ml of resin containing liquid (undiluted solution) before foaming treatment was \*\*(ed) with the value of 100 ml of resin containing liquid containing the air bubbles after foaming treatment, and it asked for expansion ratio.

[0046][A measuring method of a stoma diameter] The stoma diameter of the surface of a porous resin layer (especially outside stoma content resin layer), After using a scanning electron microscope or an optical microscope and taking a photograph of the surface of a receiving layer, Draw and copy the outline of a surface stoma with a black pen etc. on a bright film correctly, and further with a drum scanner (trademark: a 2605 type drum scan densitometer, Product made from the Abe Design). The information on the outline of a stoma was read optically and this was measured using the image analyzing device (trademark: roux ZEKKUSU III and Nireco Make). Since the shape of the stoma formed on the Honda porous layer surface was not necessarily a perfect circle, based on the area in the outline of the stoma obtained by image analysis, the stoma diameter was converted into the circle equivalent diameter, and displayed the stoma diameter.

[0047][Blocking resistance] On the stainless plate (10-cm angle) which carried out mirror finish, the lamination type porous sheet cut out on a 10-cm square, After piling up ten sheets so that the outside stoma content resin layer surface and rear face of a base material may contact (about Example 9.) On this piled-up sheet in which the outside stoma content resin layers by the side of the surface and a rear face contact, the stainless plate (10-cm angle) and weight which carried out mirror finish were put so that load of 50 g per 1-cm<sup>2</sup> of the load might be carried out. After holding under the environment of the temperature of 50 \*\*, and 80% of relative humidity for 24 hours with this state, the outside stoma content resin layer and the rear face of the base material were removed by hand, and that peeling condition was evaluated sequentially from the good thing in four steps, A, B, C, and D. A good thing practical by A and the grade which shows resistance very slightly for what does not have resistance and is extremely excellent practical here B, Although there was resistance, what it becomes like C and a sizing state about that which does not have breakage of a porous ink receiving layer and is convenient practical on recording performance, and an outside stoma content resin layer is destroyed, and is not suitable for practical use was set to D.

[0048][Porous layer cushioning properties] Using the straw graph M2 type testing machine (made in Oriental Energy Machine factory), by compression velocity 0.5 mm/min. The lamination type porous resin layer formed on sheet shaped support was compressed into the thickness direction, the stress-strain curve was drawn, about 10% of the thickness of the whole lamination type porous sheet was compressed, and the stress produced at this (making it distorted) time was measured.

[0049][Porous resin layer intensity] the endurance of a lamination type porous resin layer -- a printer (trademark: — KMP-8104 and II type thermal printer.) A bar code is printed on the outside stoma content resin layer surface using the product made from KS Systems, Next, after performing reading operation of a bar code part 3 times in a different part using a contact type bar code reader (trademark: INSPECTORIII, product made by RJS), viewing estimated the appearance on the surface of a lamination type porous sheet on the following standard at the three-stage of O, O, and x.

O : the deficit of a porous resin layer is not observed at all.

O : the slight deficit of a porous resin layer is observed.

x: The remarkable deficit of a porous resin layer is observed.

In the above-mentioned valuation basis, although O and O level fit practical use, on x level, it is not suitable for practical use.

[0050][Heat-of-fusion transfer record fitness] About the sheet which has the lamination type porous resin layer obtained by the above-mentioned Examples 1-8 and the comparative examples 1-32. The hot printing color printer after controlling the humidity under the environment of the temperature of 20 \*\*, and 65% of relative humidity one whole day and night

(trademark: although it is an image forming device of sublimation pattern transfer Trueprint2200 and originally [ ] by Victor Company of Japan, Ltd.) What was converted so that the image formation of a melting transferring method could also do this was supplied, and melting transferring record of the ink image was carried out on the surface. Visual evaluation was carried out while measuring the reflection density with the Macbeth reflection type densimeter as follows about the acquired ink transfer picture. In the following valuation basis, O level is good, it is suitable for practical use, and it is shown that the fitness of O level is still better.

(1) Using Macbeth reflection type densimeter RD-914, according to applied energy, the reflection density was measured and the highest reflection density was evaluated about the ink image (black monochrome image) formed with 17 gradation.

(2) Image quality observed the dot of the ink transferred by the receiving layer, and evaluated it by the three-stage of O, O, and \*\* sequentially from what is reproduced good.

[0051]

[Table 1]

	樹脂		塗布液の発泡倍率		塗工量 [g/m <sup>2</sup> ]		上塗り層 [g/m <sup>2</sup> ]	裏面層 [g/m <sup>2</sup> ]
	外側気孔含有樹脂層	内側気孔含有樹脂層	外側層	内側層	外側層	内側層		
実施例 1	HUX-401	780A-206	4.0	4.0	5	10	—	—
実施例 2	HUX-401	780A-206	4.0	4.0	2	13	—	—
実施例 3	モビニール742N	780A-206	4.0	4.0	5	10	—	3
実施例 4	モビニール742N	780A-206	4.0	4.0	5	10	—	—
実施例 5	HUX-401	HUX-401	2.0	8.0	7	7	—	—
実施例 6	HUX-401	780A-206	4.0	4.0	5	10	1	—
実施例 7	HUX-401	780A-206	4.0	4.0	5 (両面)	10 (両面)	—	—
実施例 8	HUX-401	780A-206	4.0	4.0	5	10	—	—
比較例 1	HUX-401	780A-206	4.0	4.0	5	10	—	—
比較例 2	780A-206 (单層)		4.0		1.5		—	—

[註] HUX-401…水性ポリウレタン樹脂  
モビニール742N…アクリル樹脂  
780A-206…SBRラテックス

[0052]

[Table 2]

	外側層表面気孔の平均孔径 [ $\mu\text{m}$ ]	耐ブロックキング性	クッション性 [kg/cm <sup>2</sup> ]	受容層強度	溶融熱転写記録適性	
					インク画像の最高反射濃度	画質
実施例 1	6	A	2.3	○	1.35	◎
実施例 2	6	B	2.2	○	1.36	◎
実施例 3	6	A	2.3	○	1.34	◎
実施例 4	6	A	2.5	○	1.30	◎
実施例 5	10	A	3.0	◎	1.30	○
実施例 6	6	A	2.7	◎	1.29	◎
実施例 7	6	C	2.0	○	1.35	◎
実施例 8	28	A	2.5	○	1.24	○
比較例 1	55	A	2.7	○	1.02	△
比較例 2	8	D	2.0	プリンター給紙不可能のため評価せず		

[0053]

[Effect of the Invention] The place which can control blocking of a sheet, and the manufacture of the lamination type porous sheet with which cushioning properties and film strength are compatible of is attained, and contributes to the industrial world by this invention is size.

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[Translation done.]

**\* NOTICES \***

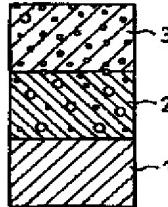
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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

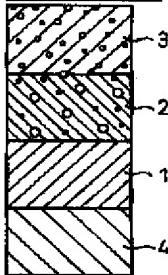
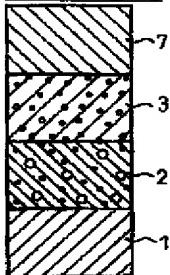
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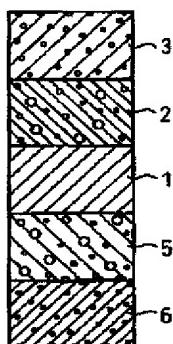
**DRAWINGS**

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**[Drawing 1]**

- 1…支持体  
2…内側気孔含有樹脂層（表面）  
3…外側気孔含有樹脂層（表面）  
4…非多孔質層（裏面）

**[Drawing 2]****[Drawing 4]****[Drawing 3]**



5 … 内側気孔含有樹脂層（裏面）  
6 … 外側気孔含有樹脂層（裏面）  
7 … 非多孔質層（表面）

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[Translation done.]